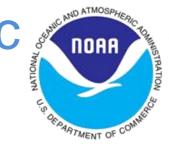
Matlab Toolbox for Automatic Clean-up of Coastal and Estuarine Tidal Datasets

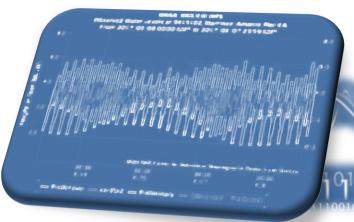


Southwest Fisheries Science Center



University of California, Santa Cruz, National Marine Fisheries Service affiliate

February 21, 2016 Sacramento

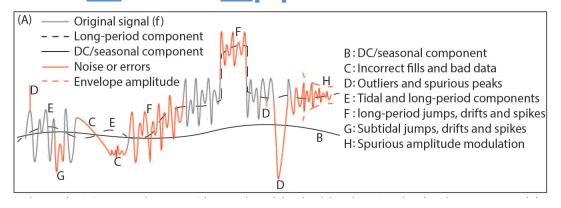


		•	•			
	-			10		
				17.90	turns a moderal sometiment consistent	
			148.5	10.14	we Sind	
		-4	42.7	22.46	Smaller Line produced consistent	
		0.00	0	15.00	tale fund contact	
	663	0.04	157.7	14.50	Smallor Liner of place dumed served Learning	
	30	0.04	144.9	15.50	and to large dispositions constituted.	
	BANK .	0.00	0	0.54	uner mantify sanditives	
	SSA	0.20	265	0.06	tole somerul unt	
	SA.	0.00	0	0.04	tale enual coduct	
	W/5*	0.00	0	1.01	unisaler syndic fotogliti, sand tust	
	507	0.00	0	1.10	unisele fotnights condition	
	MHC	0.02	150.9	12.47	Lago Lina crastional Sturnel condition	
	6 2	0.10	150.5	13.40	Large lung digits dural conditions	
	72	0.01	47.2	29.96	Largor solar dilipite meditant	-
		0.00	45	30.04	Smaller solar digita emotitant	
	201	0.01	126.9	12.55	The state form	37
	P3	0.52	242.2			100
	2507		119	-		100
		X	$\sim \sim$		16	
		1174	A A	./		
mild of	· Charles					
			100			
	0/1		(45)	1		20
Contract of		ALC: N		र प्रमाति		
			1000	1		
\smile		V				
		-	-			
				1.		
	^լ լ ի		TORE			
		VA	N Comment			
		ΛU			The state of the s	
				-		
	olonicon.	O TO HIMOTO	THE REAL PROPERTY.	-1010	AND THE RESERVE OF THE PARTY OF	

Need for data cleanup

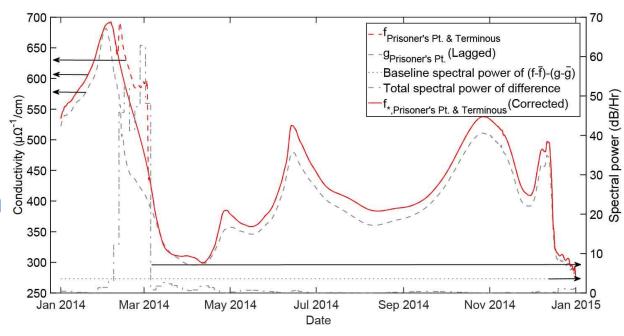
- Tide data is corrupted by various sources of error:
 - erroneous outliers,
 - junk data and blocky interpolations,
 - sudden shifts due to jolts,
 - drifts due to instrument biases,
 - spurious amplitude modulations due to scale errors,
 - high-frequency noise,
 - poor timekeeping, and
 - biases and modulations conflated with unsteadiness in the freshwater flow in estuaries.
- Corrupted data has to be subjected to extensive Quality Control:
 - can delay data delivery from days to years, and
 - urgent need for a rapid QC framework as data demand increases with state-of-the-art analysis techniques.

KATANA: <u>Kinematic Auto-Tidal Abatement</u> of <u>Noise Application</u>



Pre-processing for an estuarine signal

- Consider two signals spatially close by,
- Assume errors are iid,
- Get the periodogram of their difference,
- Remove parts with large spectral energy, and
- Reconstruct with a spline



Results

- Martinez: jumps, blocky interpolations, outliers
- Vizag: outliers
- Bournemouth: drift, damping
- Garwood Bridge: nothing wrong – sanity check
- Prisoner's Point: real and spurious jumps, outlier

Conclusions and future directions

- Automatic tool is fast and relatively error free.
- Utilizes multiple advanced signal processing techniques...
 requires parameter tuning.
- Uses proprietary tools and techniques:
 - DSP toolbox (Mathworks Inc. 2016),
 - WMTSA toolbox (Cornish et al. 2006),
 - Wavelet despiking (Patel et al. 2014)
- Needs extensive testing.
- Hilbert transforms may offier a more elegant one-stop shop approach.
- Need to work on a parameter tuning procedure.
- Will be available online and open source soon at a NOAA portal.

Thanks to...

- Andrew Hein, NMFS
- Eric Danner, NMFS
- Natnael Hamda, NMFS
- Prof. Stephen Monismith, Stanford University
- Derek Fong, Stanford University
- Tara Smith, Prabhot Sandhu and Min Yu, DWR

